DOH ARBOVIRUS WEEKLY UPDATE

August 10, 2003

West Nile virus is an emerging infectious disease, and only appeared in the eastern United States in 1999. In 2002, the virus spread to forty-four states in the United States; Oregon, Nevada, Utah and Arizona documented no West Nile virus activity. As of 31 July 2003, West Nile virus has been detected in 38 states. Verified human cases have occurred in 17 of those 38 states. As part of the West Nile virus surveillance system, the Department of Health (DOH) conducts human, avian, mammal and mosquito surveillance and keeps extensive database and spreadsheet records detailing the surveillance. DOH established a West Nile virus Call Center number at 202-535-2323, a health care and question line at 202-671-0733 and extensive web site information at http://www.dchealth.dc.gov/.

The chances of developing symptoms of West Nile virus from the bite of a mosquito are very remote. Much less than one percent of mosquitoes test positive for the virus in areas where the virus is present. And, if bitten by an infected mosquito, a person has less than a one percent chance that he or she will develop symptoms. Generally, the symptoms are very mild and may not even be noticed. Only in very rare cases will the symptoms be severe. Individuals over the age of 60 are the population most at risk. For 2002, the median age for human disease was fifty-five and the median age for mortality was 78. For 2003, the median age of WNV positive human cases is 45. Any person who suspects that they have the virus should contact their doctor immediately.

DOH has trained staff to assist residents with identifying and eliminating potential mosquito-breeding sites and to speak at neighborhood meetings and health fairs. The fundamental components of the West Nile virus plan are prevention and personal protection.

The West Nile virus program is a fluid program that is continually evaluated and altered to protect the public. Mosquito surveillance has been enhanced to assess the risk to public health and safety in the District. It is paramount to track positive mosquito pools and species. As a result of this increased mosquito surveillance, new species of mosquitoes have been identified as positive for West Nile virus in the District.

In 2002, six pools of *Aedes albopictus* tested positive in the District. This species is a daytime human biter and causes increased concern. Previously only *Culex spp*., a dawn and dusk feeder, tested positive. As a result, DOH has added precautions of protecting residents against mosquito bites at all times during the day and not just dawn and dusk.

Nationally, per CDC, in 2002, there were 4156 cases of West Nile virus infection, including 284 deaths, in the United States. The outbreak was the largest since the virus first appeared in the Western Hemisphere 4 years ago. During the 2002 outbreak, CDC officials confirmed the first known cases in which West Nile was transmitted through organ transplants and blood transfusions. The possibility the virus could be spread through breast milk or sexual contact also has been studied. Although most people who

contract West Nile have no symptoms and those who do normally suffer little more than flu-like illness, it is believed they still can carry small amounts of the virus in their blood for several days.

STATEMENT FROM USDA APHIS re: ADVERSE EFFECTS ON PREGNANT MARES

Excerpted from ProMED mail (Id: 20030724.1806)
Source: Aphis website [edited] <http://www.aphis.usda.gov>, accessed July 23, 2003

Some recent stories have suggested that the Fort Dodge Animal Health WNV Vaccine approved by the USDA may cause pregnant mares to abort or give birth to deformed foals. The misleading information in those articles has sparked many anxious phone calls from horse owners, veterinarians, and others involved with horses.

Horse owners should be assured that the vaccine is safe, and it should be used as protection against West Nile Virus. Millions of doses of the vaccine have been used since the USDA's Center for biologics approved its use in 2001.

The Center for Veterinary Biologics, within USDA's Animal and Plant Health Inspection (APHIS), maintains a toll-free telephone hotline (800-752-6255) and a mailbox on its website and actively encourages veterinarians and other vaccine customers to report problems with vaccines. <http://www.aphis.usda.gov/vs/cvb>

To date, there have been a very small number of reports regarding a possible association between the use of WNV vaccine and abortions, birth defects, or other reproductive anomalies or failures. It does not appear that there is a relationship between WNV vaccine use and these reproductive problems or any other major problems. The Center and the vaccine manufacturer will continue to collect, monitor, and track the performance of this vaccine.

WEST NILE VIRUS, FRAGMENTATION & THE BROWN-HEADED COWBIRD
Investigator: Thomas Unnasch

4 August 2003

by Laura Spinney

US researchers have found that the mosquitoes that transmit West Nile virus (WNV) to birds are quite particular about the species they feed on. One of their favorites, the brown-headed cowbird, happens to be increasing in numbers and pushing westwards through the US as a result of the fragmentation of its habitat by humans - showing how we might be driving new epidemics towards ourselves.

The primary hosts of WNV are birds. Mosquitoes that normally feed only on birds maintain a cycle of infection within them, and the virus only breaks out of that cycle to infect other species when "bridge vectors" - mosquitoes that bite both humans and birds - come into contact with an infected bird.

For that reason, the degree of contact between bird and mosquito - or horse and mosquito in the case of another, far more vicious neurological disease called Eastern equine encephalomyelitis (EEE) - is thought to be a major factor determining whether the virus crosses the species barrier. When contact is high, the virus amplifies itself more quickly and there is a higher chance that the bridge vector will come into contact with it.

To investigate how the degree of contact affects viral levels, and hence the risk of infection for humans, Thomas Unnasch of the University of Alabama at Birmingham and colleagues analyzed the stomach contents of bird-biting mosquitoes in three US states: New Jersey, New York and Tennessee. They used a reverse transcriptase-polymerase chain reaction to detect the presence of WNV, and another sensitive assay to determine the species of origin of the mosquitoes' bloodmeals.

At all the test sites, they found that of the 24 bird species the mosquitoes fed on, three accounted for more than 50% of the blood they had ingested. Of these, the most notable was the brown-headed cowbird.

Similarly, in Tuskegee National Forest, Alabama, which saw an epidemic of EEE in 2001, the first year of the study, the mosquitoes favored two species: the American robin and the brown-headed cowbird, with the cowbird accounting for more than 40% of their bloodmeals.

The American crow seemed not to be to the mosquitoes' liking at any of the sites, although American crows are regarded as "sentinels" for the arrival of WNV because they are highly susceptible to it and die off quickly once infected.

In both the EEE and WNV studies, the researchers were surprised to find that the birds the mosquitoes preferred to bite were not endemic to the swamps they themselves inhabited. The birds' usual habitats were grasslands or higher altitude ecosystems.

According to Unnasch, that suggests the mosquitoes' habitat could be larger than was previously thought, and they might forage outside swamp areas before returning to them to digest their meals and lay their eggs. At the same time, forest clearance could be enabling grassland-dwelling cowbirds to stray closer to mosquito-ridden areas.
"What we are seeing is a consistent pattern of these arboviral vectors targeting just a very few species," he says.

His team also found that in July and August a higher proportion of the mosquitoes' bloodmeals came from hosts other than birds. Before that July drop-off, however, birds were their main targets.

Unnasch thinks that the mosquitoes might be zeroing in on fledglings of certain species. He suggests that young birds are a dead-end population. Because they are virally naïve, they die quickly and provide no reservoir for transmission to other birds or humans.

However, fledglings abound early in the season and transmission generally peaks in late summer, he says, so more research is needed to explain the delayed, late summer peak.

"This to me is really interesting because of the increases we have seen in brown-headed cowbirds with the fragmentation of the landscape," said Sharon Collinge of the Department of Environmental, Population and Organismic Biology and the Environmental Studies Program at the University of Colorado, Boulder. "They've moved westwards and they tend to forage more around forest edges."

Potential Role of Alligators in West Nile Virus Transmission

Alligators might be as effective as birds at transmitting West Nile virus, University of Florida scientists have reported.

The virus is spread by mosquitoes, which transmit it from infected birds. But researchers found levels of the virus in alligators that are as high as in birds, which means that the reptiles can likely pass on the infection to other animals, said Elliot Jacobson, an expert in reptile disease at the university. "They have levels overlapping with that of some birds, and a certain level needs to be reached in order to infect mosquitoes," Jacobson said. "Horses and humans do not have these levels."

The findings come from a study of about 300 captive alligators that died in 2002 in Christmas [Florida]. Necropsies showed that the alligators had viral loads of West Nile virus that were high enough to infect mosquitoes. The alligators were probably infected initially by mosquitoes, which bite the alligators' soft eyelids, tongues, and mouths, Jacobson said. Then the alligators spread the virus among themselves through water in their holding tanks. Although birds often die within hours of contracting the virus, alligators may live for days or weeks after being infected, Jacobson said. That would allow the alligator to pass the virus on to more mosquitoes.

But overall, Jacobson said alligators probably play a small role in transmitting the virus to mosquitoes and people because there haven't been more human cases in areas with alligators.

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2003 CDC National West Nile Virus Case Summary

United States: West Nile Virus Activity; Thu 31 Jul to Wed 6 Aug 2003

This report summarizes West Nile virus (WNV) surveillance data reported to CDC through ArboNET as of 3 a.m., Mountain Daylight Time, Wed 6 Aug 2003.

During the reporting week of 31 Jul to 6 Aug 2003, a total of 109 human cases of WNV infection were reported from 13 states (Colorado, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Nebraska, New Mexico, North Dakota, Ohio, South Dakota, and Texas), including 4 fatal cases from 3 states (Alabama, Colorado, and Texas). During the same period, WNV infections were reported in 622 dead birds, 191 horses, one dog, 4 unidentified animal species, and 359 mosquito pools.

During 2003, a total of 153 human cases of WNV infection have been reported from Colorado (n = 72), Texas (n = 19), Louisiana (n = 15), South Dakota (n = 8), Ohio (n = 7), Alabama (n = 6), Nebraska (n= 6), Florida (n = 4), Minnesota (n = 4), Mississippi (n = 4), Iowa (n = 2), New Mexico (n = 2), Kansas (n = one), Kentucky (n = one), North Dakota (n = one), and South Carolina (n = one). Among 150 (98 percent) cases for which demographic data were available, 81 (54 percent) occurred among men; the median age was 45 years (range: 17 months to 87 years). Of the 153 cases, 4 fatal cases were reported from Alabama (n = one), Colorado (n = one), and Texas (n = 2). In addition, 1770 dead birds with WNV infection were reported from 36 states and New York City; 282 WNV infections in horses have been reported from 22 states (Alabama, Arkansas, Colorado, Florida, Georgia, Kansas, Kentucky, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Oklahoma, South Dakota, Tennessee, Texas, Virginia, Wisconsin, and Wyoming), 3 WNV infections were reported in dogs, and 5 infections were reported in unidentified animal species.

During 2003, WNV seroconversions have been reported in 185 sentinel chicken flocks from 8 states (Colorado, Florida, Georgia, Iowa, Louisiana, Nebraska, North Carolina, and Virginia). Louisiana and South Dekota each reported 3 seropositive sentinel horses. A total of 1038 WNV-positive mosquito pools have been reported from 20 states (Colorado, Connecticut, Georgia, Illinois, Indiana, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Nebraska, New Jersey, North Dakota, South Dakota, Tennessee, Texas, Virginia, and Wisconsin) and New York City.

District-Wide Mosquito Data

First Positive Pool Identified

We received a report July 30 of the first mosquito pool to test positive for West Nile virus. The pool of mosquitoes captured by gravid trap consisted of 25 female Culex pipiens. The pool was collected on July 16, tested on July 29 with a preliminary positive finding and confirmed positive on July 30 by the US Army at Fort Meade using the RT-PCR method.

The location of the trap is in the 3000 block of M St, NW. Teams have treated the area

with larvicide and distributed literature at that location and the surrounding eight-block area.

Second Positive Pool Identified
We received a report that mosquitoes collected by the US Army tested positive for West Nile virus. The pool of mosquitoes captured by gravid trap consisted of 15 female C*ulex pipiens.* The pool was collected on July 23, tested positive on July 28 by the US Army at Fort Meade using the RT-PCR method. The location of the trap is in the 3000 block of North Capital St, NW. Teams have larvicided and distributed literature at that location and the surrounding eight-block area.

Third Positive Pool Identified
We received a report that mosquitoes collected by the National Park Service tested positive for West Nile virus. The pool of mosquitoes captured by gravid trap consisted of female C*ulex pipiens.* The pool was collected on July 30, tested positive on August 5 by the US Army at Fort Meade using the RT-PCR method. The location of the trap is in the 3000 block of M St, NW. Teams have already larvicided and distributed literature at that location and the surrounding eight-block area.

Overall District Mosquito Update
The US Army Center for Health Promotion and Preventive Medicine –North (USACHPPM-North) tests all mosquitoes collected within the District. Specimens are submitted from Department of Defense Installations, National Park Services and the Department of Health. Nine positive mosquito pools have been identified. As of the Pool and Testing Log Report dated 8 August 2003, 4377 female mosquitoes sorted in 410 pools have been tested. The Department of Health has 428 female mosquitoes awaiting testing. Specimens have been submitted from DoD installations at Walter Reed Army Medical Center and Ft. McNair and the Armed Forces Retirement Home, National Park Services locations at Rock Creek Park, National Capital Parks-East, National Capital Parks-Central and the C & O Canal, East. Department of Health trap locations are located in each Ward of the District.

Eastern Equine Encephalitis: All mosquito pools to date have tested negative for EEE.

Malaria: 3 pools of Anopheles mosquitoes from Ft. McNair tested negative for Vivax malaria by both VecTest and PCR.

STATUS OF DISTRICT PROGRAMS:

CALL CENTER

- DOH established a West Nile Virus Call Center at 202-535-2323 effective April 11, 2003. Residents and visitors are encouraged to call the Call Center to report standing water, mosquito concerns, and dead birds and to request advice and assistance.

- The Call Center, year-to-date, has received over 281 calls regarding standing water, mosquito infestations, larvicide and dead birds.

HUMAN SURVEILLANCE

- Currently, there are 26 cases of meningitis in the District. DOH is assisting hospitals with reporting these cases. Eight cases are viral, five are bacterial, four are aseptic meningitis and nine are listed as other. There are no probable cases of West Nile virus as this time.
- DOH has contacted all hospitals to review protocol for WNV-suspect cases.
- DOH staff conducts active human surveillance.
- DOH staff distributed West Nile virus Physician Alerts by blast fax to health care providers and hospitals detailing the West Nile virus case definition, reporting and specimen collection and submission criteria.
- DOH staff contacts hospital infectious disease practitioners weekly to determine if any patients meet the testing and reporting criteria, effective May 15.
- DOH staff prepares, processes, transports and submits human specimens for testing.
- In 2001, 20 human samples were submitted for testing. All samples tested negative.
- In 2002, 80 human samples were submitted for testing. Thirty-one samples were positive. Three samples were probable, twenty-eight samples were negative and eighteen samples were considered pending because information was not complete.

MOSQUITO SURVEILLANCE

- Positive Pool Locations (total=9): 3000 blk M St, NW (2 pools); 3000 blk North Capital St, NW (7 pools).
- As of 8 August 2003, 4277 female mosquitoes placed into 410 pools have been collected within the District and tested for West Nile virus; three pools have been positive.
- Twenty-five gravid traps have been set for the week of August 4 thru August 10 in Wards 1, 2, 3, 4, 5 and 7.
- Specimens collected from the week of August 4 thru August 10 are as follows; Ward 1-45, Ward 2-0, Ward 3-82, Ward 4-110, Ward 5-34 and Ward 7-22 female mosquitoes. Mosquitoes are sent to US Army Center for Health Promotion and Preventive Medicine, Ft. Meade, MD to be sorted into pools. (A mosquito pool consists of 1-25 female mosquitoes of a specific genus and species from the same trap, location and trap night.)
- YTD, 1892 female mosquitoes have been collected by DOH and sent for testing.
- The Department of Health currently has 428 female mosquitoes awaiting testing.
- Trapping began the first week in June. Trap locations have been determined.
- DOH staff sets gravid traps, throughout the District in each ward per an established grid pattern. A collaborative effort between DOH, National Park

Services (NPS) and the Department of Defense (DoD), ensures that trapping locations incorporate all areas of the District.

- DOH staff set mosquito traps and collect specimens from over 30 traps. Traps are set for 2 trap nights per week. Mosquitoes are sorted, prepared for testing and transported the Ft. Meade, MD for arboviral testing.
- The US Army will test all District mosquito specimens for West Nile and other relevant arboviruses and malaria, depending on species.
- In 2001, 870 pools were collected in the District and submitted for testing. Three pools tested positive.
- In 2002, 1315 pools were collected in the District submitted for testing. 84 pools tested positive, including 5 pools of *Aede*s *sp.* and 79 pools of *Culex spp*. Locations of positive pools are as follows: 3100 blk Conn. Ave (1), Rock Creek Park (17), Ft. McNair (47), US Soldier and Airmen's Home (19).
- In 2002, there were 19 individual *Anopheles* mosquitoes (possible carrier of malaria) collected and placed into eight pools that were tested for malaria. All pools tested negative.

AVIAN SURVEILLANCE

- 2003: Year to date there have been 154 dead bird reports with the following break-down by ward; Ward 1-9, Ward 2-10, Ward 3-29, Ward 4-25, Ward 5-23, Ward 6-21, Ward 7-22, Ward 8-15.
- Week Bird Reports

April 14-20	4
April 21-27	3
April 28-May 4	6
May 5-11	5
May 12-18	7
May 18-25	3
May 28-June 1	26
June 2-8	19
June 9-15	12
June 16-22	7
June 23-29	5
June 30-July 6	7
July 7-13	9
July 14-20	16
July 21-27	15
July 28-August 3	13
August 14-10	16

- DOH no longer collects and tests dead birds because West Nile virus is considered endemic in the District. Further positive results of dead bird testing do not provide any relevant information. Information will be collected on sightings of dead birds for empirical information.
- The Smithsonian Institute and the US Army are testing select birds for West Nile and other arboviruses. Year-To-Date, two birds have tested positive. An

American Robin collected 7/22 from 1400 blk D Chanute, SW and a Black-crowned heron collected 7/17 from 3100 blk Connecticut Ave, NW.

- Sightings of dead birds are received and compiled at the Call Center. Residents are asked to report the location and physical description of all dead birds. A database will be established and maintained to capture all information.
- Residents are encouraged to dispose of the birds. Specific detailed instructions for disposal are available on the DC Website (dchealth.dc.gov) and at the Call Center (202-535-2323).
- In 2000, the first positive bird was collected on September 28, with a total of 5 positive birds for the year.
- In 2001, the first positive bird was collected on July 10. Nine hundred fourteen (914) birds were collected, four hundred forty-four (444) were tested and three hundred sixty (360) tested positive, with a percent of positivity of 81.08%.
- In 2002, the first positive bird was collected on May 1. Nine hundred five (905) birds were collected, three hundred forty (340) were processed for testing, thirty-one (31) tested negative, one hundred thirty-four (134) were disposed of and one hundred seventy-five (175) birds tested positive with a rate of positivity of 84.95%.
- The positive bird breakdown by ward for 2002 was Ward 1-10, Ward 2-8, Ward 3-123, Ward 4-12, Ward 5-2, Ward 6-7, Ward 7-16, and Ward 8-2.

MOSQUITO CONTROL

- As surveillance data reflects locations of West Nile virus activity, staff will larvicide an eight-square block area surrounding these sites.
- Year-to-date 2003, DOH staff has larvicided 2927 catch basins. The Ward breakdown is as follows; Ward 1-188 catch basin; Ward 2-222 catch basins; Ward 3-864 basins; Ward 4-498 basins; Ward 5-365 basins; Ward 6-257 basins; Ward 7-318; Ward 8-215 catch basins.
- Year-to-date 2003, DOH staff has applied larvicidal treatments in alleys with improper drainage, ponds, swamps and park sites in 40 locations, 9 of which are constant bodies of water.
- DOH staff larvicide in response to WNV positive human test results, WNV positive mosquito results, mosquito density and nuisance areas and community concerns. The larvicide, a biological product that kills mosquitoes in the larval stage, is placed in catch basins and in areas of standing or stagnant water.
- In April of 2002, DOH staff began larviciding in the District at locations of positive birds and mosquitoes from the previous year in an eight square block area at each location.
- The larvicide application is repeated approximately every 5-6 weeks.
- Larviciding has been determined to be more effective over a period of time than adulticiding. In 2002, mosquito catches were significantly reduced in areas where larviciding efforts were conducted.
- In 2001, DOH staff larvicided three thousand four hundred ninety-six (3,496) catch basins.
- In 2002, DOH staff larvicided ten thousand eight hundred thirty-five (10,835) catch basins.

- The District does not expect to spray for mosquitoes because of low efficacy; die-offs of non-target species and potential health risks to a high population of persons affected with respiratory problems and compromised immune systems.
- Killing mosquito larva and eliminating mosquito-breeding sites are the most effective practices to reduce the numbers of mosquitoes.
- The Center for Disease Control and Prevention (CDC) recommends that larvicide be used to reduce mosquito populations.

MAMMAL SURVEILLANCE

- DOH staff conducts passive mammal surveillance.
- DOH staff distributed information to vets, pet shops, and horse stable managers detailing reporting and specimen collection and submission criteria and protocol.
- No mammals have tested positive in the District for the last four years.
- Letters to all veterinarians in the District have been sent to assist veterinarians in recognizing, submitted samples for testing and reporting West Nile virus cases.

OUTREACH AND EDUCATION

- In 2003, year to date, approximately 38,696 brochures have been distributed to elderly homes, day care providers, neighborhood services, door-to-door and to all DC Libraries. Literature has also been available at various events.
- DOH Representatives have participated in 8 media interviews with CNN, Channel 7/8, Washington Post, WHUR Radio, Channel 9, Metro Weekly News, Washington Times and Channel 5.
- DOH has educated participants of the DC Government Safety Fair by setting up a booth, passing out literature and speaking with concerned citizens.
- DOH has prepared an informational brochure emphasizing prevention and protection. The brochure has contact information for the Call Center and website. It has been translated into Spanish, Chinese, Korean and Vietnamese.
- DOH has developed space on the DOH website to provide residents with information, including, the District Arbovirus Surveillance and Response Plan for 2003, methods of controlling mosquitoes, CDC questions and answers, recent press releases and weekly updated surveillance reports.
- DOH has developed an informational script and power point presentation for community presentations.
- In 2002, DOH staff distributed brochures door to door to 46,987 residences, and spoke to residents about prevention and protection techniques. DOH distributed approximately 201,250 brochures in bulk.
- Brochures have been distributed by request to private citizens, day care centers, senior citizen homes, residential housing, hospitals, libraries, schools, parks and recreation centers, churches, other District agencies, NSC Coordinators and all ANC Commissioners.